



Augmented Reality

WHAT IS AUGMENTED REALITY?

Augmented Reality is a technology that superimposes a computer-generated image onto a user's view of the real world in real-time. The augmented reality software that comes with this book, AR Engineering, helps you learn 3D visualization skills by combining virtual 3D models with real-time video. The result is a unique experience; an interactive world that makes the learning process faster and more engaging. This book represents a new way of adapting traditional engineering graphics materials to modern times.

ABOUT THE AR ENGINEERING SOFTWARE

This textbook comes with augmented reality computer software and apps, called AR Engineering. AR Engineering is designed to be used while you progress through the text. The AR Engineering software and apps, in conjunction with the book, allow you to visualize the models described in the text in full 3D. Versions of the AR Engineering software are available for both the Mac and PC operating systems. AR Engineering apps are available for both Apple® iOS and Android® smartphones and tablets.

After you install the AR Engineering software or app onto your device, place the markers located throughout the book along with the large primary marker found at the front of this book, so they are both visible to your device's camera. A 3D model will appear on your screen, superimposed on top of the large marker. As you rotate and move the marker the 3D model will follow your movements, allowing you to manipulate the 3D model in real time.



Depiction of a 3D object being superimposed on top of a book using augmented reality **FIG. 1**



AR Engineering Logo **FIG. 2**



Installation

INSTALLING THE AR ENGINEERING SOFTWARE

Load the CD, packaged with this book, into your computer. If your computer does not have a disc drive you can download the software from the publisher's website at www.SDCpublications.com. Locate the version of the software that matches your operating system and double click the software installer. A software installer will appear that will walk you through a series of steps to complete the installation.



FIG. 3 AR Engineering app QR code

INSTALLING THE AR ENGINEERING APPS

AR Engineering for Apple® iOS devices can be downloaded from the Apple® App Store. AR Engineering for Android devices is available from the Google® Play Store. If your device has an app installed that can read QR codes you can use it to scan the QR code to the left (see [Figure 3](#)) and you will be redirected to the correct app for your device. Otherwise, visit your device's corresponding app store and search for AR Engineering. AR Engineering was developed by Bienetec.

USING THE 3D MODELS

In addition to the AR Engineering software and Apps, SolidWorks® files of the models used throughout the book are available. These files are included on the CD or are available for download from the publisher's website at www.SDCpublications.com. In addition, STL files have been provided so the models can be opened using your solid modeling CAD package of choice or printed using a 3D printer.





Using AR Engineering

1. LAUNCH AR ENGINEERING

Once you have the AR Engineering software or app installed on your device you will need to start the application. To start the software, locate and select the AR Engineering icon. If you are using the AR Engineering software on a Mac or PC you will need to have a webcam connected for the software to work correctly. The webcam can be a built-in or an external webcam.

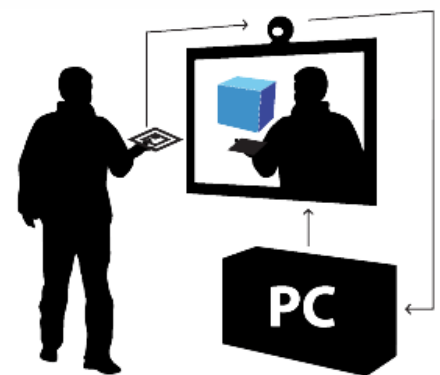
If you are using the AR Engineering App, you will be given two viewing choices when the software loads. The app will ask you if you want to view the 3D models 'Without AR' or 'With AR'. Choosing 'Without AR' will allow you to view the 3D models without augmented reality. Choosing 'With AR' will allow you view the 3D models using augmented reality.

2. SCAN THE MARKERS IN THE BOOK

Starting in chapter two, at the top of many of the pages will be two black squares with white shapes inside of them. These are called markers. Place the book so your device's camera can see and detect the markers on the page. Green boxes will outline the markers when the software has successfully detected them. This tells the software what page you are on so it knows what 3D model to load. The chapter and section title will also now appear at the top of screen.

3. MANIPULATE THE 3D MODEL

Place the large marker located at the front of this book so that it is visible to your device's camera. A 3D model will appear on your screen superimposed on top of the marker. You can now interact with the 3D model. As you rotate and move the marker the 3D model will also follow your movements, allowing you to manipulate the 3D model in real time. (see [Figure 4](#))



Depiction of the AR Engineering software in use **FIG. 4**



Troubleshooting

If you have trouble getting the software to recognize the markers, review the following tips:

- Be sure the marker is flat. If the marker is curved or bent the software might not correctly recognize its shape.
- Make sure your device's camera can "see" the entire marker. If the markers are even slightly covered, or not entirely visible to the camera, the virtual content will not display. Additionally, it is necessary to keep a small white margin around the marker.
- You may need to adjust your camera's distance from the marker. Try moving the marker closer or farther away from your device's camera. In some cases moving the marker farther away may make it easier for the software to detect it.
- Try adjusting the angle of the marker to the camera. Adjust the marker so that the camera points perpendicular to the marker.
- Make sure your device's camera is focused on the marker. If the camera is out of focus the marker will appear blurry and the software will not be able to recognize it.
- Check the lighting. If the lighting is too bright or too dark the software will have a hard time recognizing the marker. You may be able to adjust your camera's settings or the lighting in your room to correct this.

SYSTEM REQUIREMENTS

Mac and PC

- Intel Dual Core or higher
- 1 GB RAM (2 GB recommended)
- A computer with a webcam (built-in or external)

iOS and Android

- A smartphone or tablet with built-in camera

AR Engineering has been tested on Windows XP SP3 / Vista / Windows 7 / Windows 8 / iOS and Android Devices. The Mac version has been tested on Mountain Lion 10.8.2

